

Trend Study 16B-9-02

Study site name: Starvation Mountain Brush.

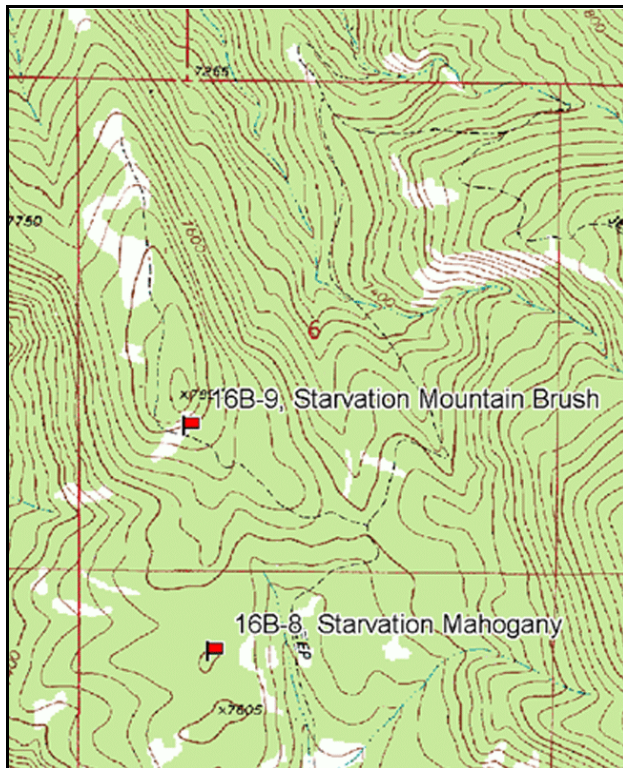
Vegetation type: Mountain Brush.

Compass bearing: frequency baseline 175 degrees magnetic.

Frequency belt placement: line 1 (11 and 95 ft), line 2 (34 ft), line 3 (59 ft), line 4 (71ft).

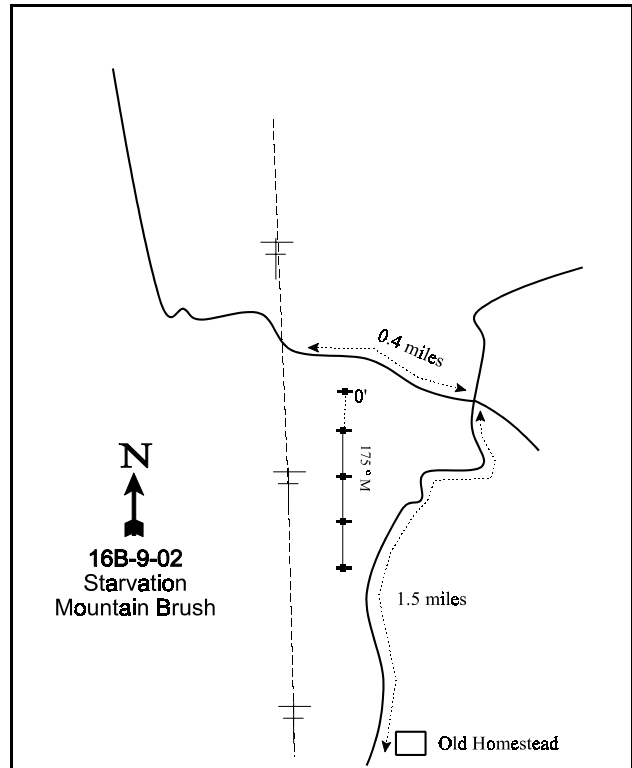
LOCATION DESCRIPTION

From Tucker rest area on Highway 50/6 in Spanish Fork Canyon, take the Starvation Canyon road 4.6 miles. Turn left and go 0.5 miles to another fork. Turn left and go up a small canyon on a rough road for 1.15 miles to a fork. Turn left, cross the creek, and go 0.3 miles to an old homestead site. Continue on this road for 1.5 miles to a 4-way intersection. Turn left (west) and go 0.4 miles and park beneath the powerlines. The 0-foot stake of the baseline is 30 feet away from the road marked by browse tag #432.



Map Name: Tucker

Township 11S, Range 7E, Section 6



Diagrammatic Sketch

GPS: NAD 27, UTM 12S 4415397 N 484099 E

DISCUSSION

Starvation Mountain Brush - Trend Study No. 16B-9

The Starvation Mountain Brush trend study samples a mixed mountain brush community in the Starvation Creek drainage on DWR property. Slope of the site ranges from 25-35%. Aspect is to the south and elevation is 7,800 feet. This study lies above and north of the curlleaf mahogany bench sampled by trend study 16B-8. The site was established in 1989 to monitor use by wildlife. Use by big game has been moderate on the site. Pellet group transect data estimated 45 deer days use/acre (111 ddu/ha) and 64 elk days use/acre (159 edu/ha) in 1999. In 2002, deer use was estimated at 68 days use/acre (169 ddu/ha) and 19 elk days use/acre (48 edu/ha). The surrounding area provides excellent thermal and escape for wildlife with large curlleaf mahogany thickets scattered in all directions. Several perennial water sources exist in the nearby area with the Spanish Fork River within a few miles to the north, Starvation Creek one-half mile to the west, and a spring three-fourths mile to the south.

Soils have a clay loam texture and are slightly alkaline in reactivity (pH of 7.4). The profile is shallow and rocky with an estimated effective rooting depth of just over 12 inches. Organic matter is very high at 5.5%, while phosphorus levels (8.5 ppm) are lower than the minimum (10 ppm) thought necessary for normal plant development and growth. Most of the bare areas are covered with rock and pavement. When coupled with the steep terrain, these rocky slopes tend to increase run-off, significantly reducing the amount of effective precipitation. Erosion potential is moderate to severe, especially during severe thunderstorms with the formation of rills and the movement of litter downslope. Abundant pedestalling and terracing is occurring on the steeper areas. The erosion condition class assessment was determined as slight in 2002.

Browse at the site is diverse with many key species present. The most important species include Utah serviceberry, mountain big sagebrush, true mountain mahogany, and antelope bitterbrush. These key species provide about half of the total browse cover, and 40% of the total vegetation cover on the site. The sagebrush is classified as mountain big sagebrush (*Artemisia tridentata vaseyana*), but some of the population displays characteristics of basin big sagebrush (*Artemisia tridentata tridentata*). It is likely that a portion of the population is a hybrid of the two subspecies. Sagebrush density was estimated at 1,660 plants/acre in 1999, slightly increasing to 1,800 plants/acre in 2002. These estimates are lower than the initial estimate of 2,666 plants/acre in 1989. The extension of the baseline in 1999 accounts for most of the differences in sagebrush density. This much larger sample size better samples browse populations that have clumped and/or discontinuous distributions. The proportion of the population classified as decadent and in poor vigor increased in 2002, and young recruitment declined to only 1% of the population. These changes can be expected with the drought conditions experienced in 2002. However, the increases in decadence and poor vigor on sagebrush are not extreme, and should improve with better precipitation in the future. Utilization on sagebrush has been moderate to heavy in all readings. Annual growth on sagebrush averaged just under 2 inches in 2002.

Serviceberry had an estimated density of 1,060 plants/acre in 1999, increasing to 1,400 plants/acre in 2002. The serviceberry population is slightly increasing due to a high proportion of young plants being recruited into the population (25% in 1999, and 30% in 2002). In 1999, a high proportion of the decadent age class were classified as dying (77%), and it was noted as being a concern for a possible decrease in population density. In 2002, decadency slightly increased but the proportion of decadent plants classified as dying decreased. Currently ('02), recruitment from young plants is higher than the number of plants expected to die in the future. Utilization has remained moderate to heavy since site establishment in 1989. In 1999, most of the leader growth on serviceberry was good (3-5 inches), with most being restricted to those stems which are protected and/or unavailable to browsing animals. Leader growth averaged less than 2 inches in 2002. True mountain mahogany had an estimated density of 1,120 plants/acre in 1999 and 2002. Heavy use was high, ranging from 55% in 1999 to 93% in 2002. However, this species is tolerant to heavy browsing with most of the population displaying normal vigor. The decadent age class doubled between 1999 and 2002 to 300 plants/acre, but with drought, this increase is not extreme and should improve with better precipitation. Recruitment declined slightly in 2002, but remains adequate to maintain the population.

Bitterbrush has the lowest population density of all the key browse, estimated at just over 500 plants/acre. In 2002, percent decadence and plants displaying poor vigor increased, while recruitment from young plants decreased. All of these changes are consistent with drought conditions and should improve as precipitation patterns improve. Use was mostly moderate in 1989 and 1999, increasing to heavy in 2002.

The few juniper trees found on the site in 1999 were cut down in 2002, because part of the study site occurs under high tension power lines.

The herbaceous understory is dominated by perennial species. The presence of seeded grasses indicates that some seeding has been done in the area, probably to revegetate the power line corridor which runs directly through the area. Crested wheatgrass is the dominant species providing 71% of the grass cover in 1999 and 92% in 2002. Other perennial grasses include bluebunch wheatgrass, mutton bluegrass, Indian ricegrass, Kentucky bluegrass, and Intermediate wheatgrass. Forbs are diverse as well. Hoods phlox is the most abundant forb, which provides nearly half off the forb cover. All other species occur infrequently. Annuals are present but infrequent, and are not significant in the community at the present time. With drought in 2002, perennial grasses remained stable in sum of nested frequency, while perennial forbs declined.

1989 APPARENT TREND ASSESSMENT

Soils appear to have a downward trend on this site with the presence of active gullies and evidence of soil movement. Trend for browse and the herbaceous understory appears to be stable at the present time. However, continued heavy use coupled with drought may reverse this trend in the future.

1999 TREND ASSESSMENT

Trend for soil is slightly down with a decrease in litter cover, and an increase in bare ground. Soil movement is evident with pedestalling occurring around the base of most vegetation. The trend for the key browse is mixed. The most preferred species, serviceberry, true mountain mahogany, and bitterbrush, show good recruitment from young plants. Use is moderate to heavy on these species. However, all are tolerant of heavy browsing. Biotic potential and recruitment for big sagebrush is low. Big sagebrush (most likely a hybrid between mountain big sagebrush and basin big sagebrush) shows moderate to heavy use on nearly half of the population. Currently, 10% of the big sagebrush population displays poor vigor. Overall, browse trend is stable. The herbaceous understory trend is up slightly. Sum of nested frequency for perennials increased, while annuals are an insignificant influence on the site.

TREND ASSESSMENT

soil - slightly down (2)

browse - stable overall for the key species (3)

herbaceous understory - up slightly (4)

2002 TREND ASSESSMENT

Trend for soil is again slightly down. Litter cover decreased, and bare soil increased. Erosion remains a factor on the site, and the erosion condition class assessment was determined to be slight in 2002. Trend for browse is stable. The key browse species are showing some negative effects from the drought, but densities remain stable. Increases in percent decadence and poor vigor, and a decrease in reproduction are all changes consistent with dry conditions. These changes were not extreme for the three most abundant species, serviceberry, big sagebrush, and true mountain mahogany. All of these parameters should improve with better precipitation in the future. Utilization did increase on all of the key species. However, with the exception of sagebrush, the key browse are tolerant to heavy browsing. Trend for the herbaceous understory is stable. Perennial grasses remained stable in sum of nested frequency, while forbs declined. However, the decline in forb abundance is not enough to warrant a downward trend. Forbs are usually the first component in the vegetative community to decline with drought and they should rebound with better precipitation in the future, especially at this elevation.

TREND ASSESSMENT

soil - slightly down (2)

browse - stable (3)

herbaceous understory - stable (3)

HERBACEOUS TRENDS --

Herd unit 16B, Study no: 9

| T y p e | Species | Nested Frequency | | | Quadrat Frequency | | | Average Cover % | |
|-----------------------------|-----------------------|------------------|------------------|------------------|-------------------|-----|-----|-----------------|-------|
| | | '89 | '99 | '02 | '89 | '99 | '02 | '99 | '02 |
| G | Agropyron cristatum | _a 78 | _b 168 | _b 180 | 32 | 58 | 61 | 4.31 | 9.44 |
| G | Agropyron intermedium | 6 | 8 | 6 | 2 | 4 | 3 | .18 | .07 |
| G | Agropyron smithii | - | - | 4 | - | - | 2 | - | .15 |
| G | Agropyron spicatum | _b 55 | _{ab} 25 | _b 10 | 21 | 13 | 7 | .62 | .08 |
| G | Bromus inermis | 4 | 1 | - | 2 | 1 | - | .00 | - |
| G | Bromus tectorum (a) | - | _b 23 | _a 4 | - | 9 | 2 | .22 | .03 |
| G | Carex spp. | - | 3 | 5 | - | 1 | 3 | .00 | .09 |
| G | Oryzopsis hymenoides | - | 3 | 8 | - | 1 | 3 | .03 | .06 |
| G | Poa fendleriana | 26 | 18 | 20 | 13 | 9 | 9 | .36 | .14 |
| G | Poa pratensis | - | 5 | 6 | - | 2 | 2 | .30 | .18 |
| G | Sitanion hystrix | _b 21 | _{ab} 4 | _a 1 | 7 | 4 | 1 | .02 | .03 |
| G | Stipa lettermani | 1 | - | - | 1 | - | - | - | - |
| Total for Annual Grasses | | 0 | 23 | 4 | 0 | 9 | 2 | 0.21 | 0.03 |
| Total for Perennial Grasses | | 191 | 235 | 240 | 78 | 93 | 91 | 5.85 | 10.26 |
| Total for Grasses | | 191 | 258 | 244 | 78 | 102 | 93 | 6.07 | 10.29 |

| Type | Species | Nested Frequency | | | Quadrat Frequency | | | Average Cover % | |
|---------------------------|-----------------------------|------------------|-----------------|-----------------|-------------------|-----|-----|-----------------|------|
| | | '89 | '99 | '02 | '89 | '99 | '02 | '99 | '02 |
| F | Agoseris glauca | - | - | 2 | - | - | 1 | - | .00 |
| F | Arabis spp. | - | - | 1 | - | - | 1 | - | .00 |
| F | Aster chilensis | - | - | 4 | - | - | 2 | - | .01 |
| F | Astragalus convallarius | - | - | 1 | - | - | 1 | - | .00 |
| F | Astragalus spp. | 8 | - | - | 3 | - | - | - | - |
| F | Calochortus nuttallii | - | - | 2 | - | - | 1 | - | .00 |
| F | Chaenactis douglasii | 14 | 19 | 4 | 6 | 8 | 2 | .07 | .01 |
| F | Cirsium spp. | 8 | 19 | 7 | 5 | 10 | 4 | .08 | .09 |
| F | Collomia linearis (a) | - | - | 3 | - | - | 1 | - | .00 |
| F | Cryptantha spp. | _a - | _b 16 | _a 7 | - | 6 | 3 | .45 | .18 |
| F | Cynoglossum officinale | 2 | - | - | 1 | - | - | - | - |
| F | Eriogonum racemosum | 1 | 1 | - | 1 | 1 | - | .00 | - |
| F | Eriogonum umbellatum | 2 | 3 | 3 | 1 | 1 | 1 | .03 | .00 |
| F | Machaeranthera canescens | _b 91 | _a 21 | _a 20 | 40 | 11 | 9 | .13 | .23 |
| F | Microsteris gracilis (a) | - | 1 | - | - | 1 | - | .00 | - |
| F | Penstemon caespitosus | - | 1 | 2 | - | 1 | 2 | .00 | .01 |
| F | Penstemon cyananthus | 30 | 31 | 21 | 17 | 17 | 12 | .18 | .53 |
| F | Penstemon humilis | _b 11 | _a - | _{ab} 4 | 5 | - | 2 | - | .01 |
| F | Penstemon spp. | _a 14 | _b 31 | _a 14 | 8 | 17 | 6 | .85 | .10 |
| F | Phlox hoodii | _a 16 | _b 81 | _b 59 | 7 | 36 | 28 | 1.89 | 1.14 |
| F | Phlox longifolia | _b 51 | _a 7 | _a 17 | 27 | 3 | 7 | .01 | .06 |
| F | Ranunculus testiculatus (a) | - | - | 3 | - | - | 2 | - | .01 |
| F | Streptanthus cordatus | 4 | 4 | 3 | 2 | 2 | 1 | .01 | .00 |
| F | Taraxacum officinale | 1 | 7 | - | 1 | 3 | - | .04 | - |
| F | Tragopogon dubius | - | 3 | - | - | 1 | - | .00 | - |
| F | Veronica biloba (a) | - | - | 3 | - | - | 1 | - | .00 |
| F | Verbascum thapsus | 1 | - | - | 1 | - | - | - | - |
| F | Viguiera multiflora | - | 5 | 5 | - | 2 | 2 | .06 | .06 |
| Total for Annual Forbs | | 0 | 1 | 9 | 0 | 1 | 4 | 0.00 | 0.01 |
| Total for Perennial Forbs | | 254 | 249 | 176 | 125 | 119 | 85 | 3.84 | 2.50 |
| Total for Forbs | | 254 | 250 | 185 | 125 | 120 | 89 | 3.85 | 2.51 |

Values with different subscript letters are significantly different at alpha = 0.10

BROWSE TRENDS --

Herd unit 16B, Study no: 9

| Type | Species | Strip Frequency | | Average Cover % | |
|------------------|--|-----------------|-----|-----------------|-------|
| | | '99 | '02 | '99 | '02 |
| B | Amelanchier utahensis | 42 | 42 | 2.33 | 2.07 |
| B | Artemisia tridentata vaseyana | 50 | 54 | 7.06 | 9.42 |
| B | Cercocarpus montanus | 46 | 41 | 4.28 | 3.96 |
| B | Chrysothamnus depressus | 2 | 3 | - | - |
| B | Chrysothamnus viscidiflorus viscidiflorus | 44 | 47 | 2.21 | 1.54 |
| B | Juniperus osteosperma | 0 | 0 | 1.23 | .00 |
| B | Mahonia repens | 7 | 6 | .51 | .01 |
| B | Opuntia spp. | 1 | 2 | .00 | .01 |
| B | Purshia tridentata | 19 | 18 | 3.33 | 2.73 |
| B | Quercus gambelii | 0 | 0 | .00 | - |
| B | Symphoricarpos oreophilus | 91 | 87 | 14.12 | 10.95 |
| B | Tetradymia canescens | 20 | 15 | 1.09 | 1.88 |
| Total for Browse | | 322 | 315 | 36.20 | 32.61 |

CANOPY COVER -- LINE INTERCEPT

Herd unit 16B, Study no: 9

| Species | Percent Cover | |
|--|---------------|-------|
| | '99 | '02 |
| Amelanchier utahensis | .20 | 1.50 |
| Artemisia tridentata vaseyana | .20 | 6.80 |
| Cercocarpus montanus | - | 4.00 |
| Chrysothamnus depressus | - | .08 |
| Chrysothamnus viscidiflorus viscidiflorus | - | 2.83 |
| Juniperus osteosperma | 2 | - |
| Purshia tridentata | - | 3.17 |
| Symphoricarpos oreophilus | - | 13.42 |
| Tetradymia canescens | - | 1.58 |

Key Browse Annual Leader Growth

Herd unit 16B , Study no: 9

| Species | Average leader growth (in) '02 |
|-------------------------------|-----------------------------------|
| Amelanchier alnifolia | 1.6 |
| Artemisia tridentata vaseyana | 1.9 |
| Cercocarpus montanus | 1.3 |
| Purshia tridentata | 3.8 |

BASIC COVER --

Herd unit 16B, Study no: 9

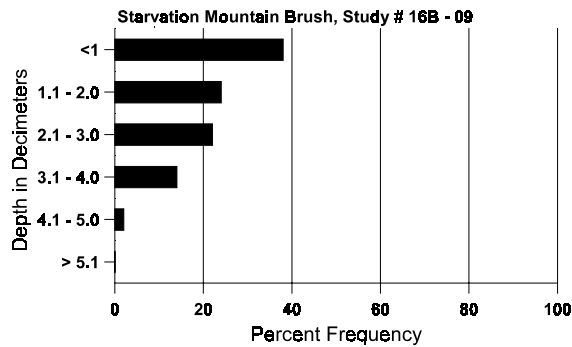
| Cover Type | Nested Frequency | | Average Cover % | | |
|-------------|------------------|-----|-----------------|-------|-------|
| | '99 | '02 | '89 | '99 | '02 |
| Vegetation | 309 | 300 | 12.50 | 41.06 | 41.41 |
| Rock | 150 | 152 | 12.00 | 6.14 | 5.58 |
| Pavement | 202 | 193 | 11.50 | 3.91 | 3.01 |
| Litter | 377 | 382 | 54.25 | 50.65 | 40.02 |
| Cryptogams | 63 | 8 | .50 | 2.03 | .10 |
| Bare Ground | 246 | 289 | 4.00 | 18.73 | 26.22 |

SOIL ANALYSIS DATA --

Herd Unit 16B, Study # 09, Starvation Mountain Brush

| Effective rooting depth (inches) | Temp °F (depth) | pH | %sand | %silt | %clay | %OM | PPM P | PPM K | dS/m |
|----------------------------------|-----------------|-----|-------|-------|-------|-----|-------|-------|------|
| 12.5 | 51.0 (13.3) | 7.4 | 36.7 | 22.7 | 40.6 | 5.5 | 8.5 | 121.6 | 0.7 |

Stoniness Index



PELLET GROUP FREQUENCY --

Herd unit 16B, Study no: 9

| Type | Quadrat Frequency | | Pellet Transect | | | |
|--------|-------------------|-----|------------------------|-----|------------------------|----------|
| | '99 | '02 | Pellet Groups per Acre | | Days Use per Acre (ha) | |
| | | | '99 | '02 | '99 | '02 |
| Sheep | 3 | 1 | 60 | - | 5 (11) | - |
| Rabbit | 2 | 7 | - | - | - | - |
| Elk | 37 | 20 | 832 | 252 | 64 (158) | 19 (48) |
| Deer | 22 | 31 | 702 | 887 | 54 (111) | 68 (168) |

BROWSE CHARACTERISTICS --

Herd unit 16B, Study no: 9

| A G R E | Y R | Form Class (No. of Plants) | | | | | | | | | Vigor Class | | | | Plants Per Acre | Average (inches) Ht. Cr. | | Total |
|--|--------|----------------------------|----|----|------------------|---|---|-------------------|---|---|----------------|-----|------|------|--------------------|--------------------------------|----|-------|
| | | 1 | 2 | 3 | 4 | 5 | 6 | 7 | 8 | 9 | 1 | 2 | 3 | 4 | | | | |
| Amelanchier utahensis | | | | | | | | | | | | | | | | | | |
| S | 89 | 9 | - | - | - | - | 1 | 1 | - | - | 11 | - | - | - | 733 | | | 11 |
| | 99 | 5 | - | - | - | - | - | - | - | - | 5 | - | - | - | 100 | | | 5 |
| | 02 | - | - | - | - | - | - | - | - | - | - | - | - | - | 0 | | | 0 |
| Y | 89 | 16 | 29 | 4 | 1 | - | - | 1 | - | - | 49 | - | 2 | - | 3400 | | | 51 |
| | 99 | 5 | 3 | - | 3 | 2 | - | - | - | - | 11 | - | 2 | - | 260 | | | 13 |
| | 02 | 3 | - | 4 | 9 | - | 3 | 2 | - | - | 21 | - | - | - | 420 | | | 21 |
| M | 89 | - | - | 10 | - | - | 1 | - | - | - | 11 | - | - | - | 733 | 28 | 27 | 11 |
| | 99 | - | 3 | 9 | 3 | 6 | 6 | - | - | - | 26 | - | 1 | - | 540 | 24 | 23 | 27 |
| | 02 | 2 | - | 11 | 5 | 3 | 5 | 1 | - | - | 27 | - | - | - | 540 | 19 | 21 | 27 |
| D | 89 | - | - | 9 | - | - | - | - | - | - | 9 | - | - | - | 600 | | | 9 |
| | 99 | 1 | 1 | 2 | 2 | 1 | 2 | 4 | - | - | 3 | - | - | 10 | 260 | | | 13 |
| | 02 | 1 | - | 16 | - | 2 | 3 | - | - | - | 12 | - | - | 10 | 440 | | | 22 |
| X | 89 | - | - | - | - | - | - | - | - | - | - | - | - | - | 0 | | | 0 |
| | 99 | - | - | - | - | - | - | - | - | - | - | - | - | - | 180 | | | 9 |
| | 02 | - | - | - | - | - | - | - | - | - | - | - | - | - | 60 | | | 3 |
| % Plants Showing | | <u>Moderate Use</u> | | | <u>Heavy Use</u> | | | <u>Poor Vigor</u> | | | <u>%Change</u> | | | | | | | |
| '89 | | 41% | | | 34% | | | 03% | | | -78% | | | | | | | |
| '99 | | 30% | | | 36% | | | 25% | | | +24% | | | | | | | |
| '02 | | 07% | | | 60% | | | 14% | | | | | | | | | | |
| Total Plants/Acre (excluding Dead & Seedlings) | | | | | | | | | | | | '89 | 4733 | Dec: | 13% | | | |
| | | | | | | | | | | | | '99 | 1060 | | 25% | | | |
| | | | | | | | | | | | | '02 | 1400 | | 31% | | | |
| Artemisia tridentata vaseyana | | | | | | | | | | | | | | | | | | |
| S | 89 | 1 | - | - | - | - | - | - | - | - | 1 | - | - | - | 66 | | | 1 |
| | 99 | 1 | - | - | - | - | - | 1 | - | - | 2 | - | - | - | 40 | | | 2 |
| | 02 | - | - | - | - | - | - | - | - | - | - | - | - | - | 0 | | | 0 |
| Y | 89 | 8 | - | 1 | - | - | - | - | - | - | 9 | - | - | - | 600 | | | 9 |
| | 99 | 5 | - | - | - | - | - | - | - | - | 5 | - | - | - | 100 | | | 5 |
| | 02 | - | 1 | - | - | - | - | - | - | - | 1 | - | - | - | 20 | | | 1 |
| M | 89 | 2 | 7 | 8 | - | - | - | - | - | - | 17 | - | - | - | 1133 | 21 | 22 | 17 |
| | 99 | 28 | 27 | 6 | - | - | - | 1 | - | - | 62 | - | - | - | 1240 | 23 | 30 | 62 |
| | 02 | 7 | 20 | 37 | - | - | 1 | 1 | - | - | 61 | 3 | 2 | - | 1320 | 21 | 27 | 66 |
| D | 89 | 1 | 3 | 10 | - | - | - | - | - | - | 14 | - | - | - | 933 | | | 14 |
| | 99 | 2 | 3 | - | 3 | - | 5 | 3 | - | - | 8 | - | - | 8 | 320 | | | 16 |
| | 02 | 6 | 7 | 10 | - | - | - | - | - | - | 12 | - | 3 | 8 | 460 | | | 23 |
| X | 89 | - | - | - | - | - | - | - | - | - | - | - | - | - | 0 | | | 0 |
| | 99 | - | - | - | - | - | - | - | - | - | - | - | - | - | 980 | | | 49 |
| | 02 | - | - | - | - | - | - | - | - | - | - | - | - | - | 600 | | | 30 |
| % Plants Showing | | <u>Moderate Use</u> | | | <u>Heavy Use</u> | | | <u>Poor Vigor</u> | | | <u>%Change</u> | | | | | | | |
| '89 | | 25% | | | 48% | | | 00% | | | -38% | | | | | | | |
| '99 | | 36% | | | 13% | | | 10% | | | + 8% | | | | | | | |
| '02 | | 31% | | | 53% | | | 14% | | | | | | | | | | |
| Total Plants/Acre (excluding Dead & Seedlings) | | | | | | | | | | | | '89 | 2666 | Dec: | 35% | | | |
| | | | | | | | | | | | | '99 | 1660 | | 19% | | | |
| | | | | | | | | | | | | '02 | 1800 | | 26% | | | |

| A G E | Y R | Form Class (No. of Plants) | | | | | | | | | Vigor Class | | | | Plants Per Acre | Average (inches) Ht. Cr. | | Total |
|--|--------|----------------------------|---|----|------------------|---|----|-------------------|---|---|----------------|-----|------|------|--------------------|--------------------------------|----|-------|
| | | 1 | 2 | 3 | 4 | 5 | 6 | 7 | 8 | 9 | 1 | 2 | 3 | 4 | | | | |
| Cercocarpus montanus | | | | | | | | | | | | | | | | | | |
| S | 89 | 1 | - | - | - | - | - | - | - | - | 1 | - | - | - | 66 | | 1 | |
| | 99 | 4 | 1 | - | - | - | - | 1 | - | - | 6 | - | - | - | 120 | | 6 | |
| | 02 | - | - | - | - | - | - | - | - | - | - | - | - | - | 0 | | 0 | |
| Y | 89 | - | 1 | - | - | - | - | 1 | - | - | 2 | - | - | - | 133 | | 2 | |
| | 99 | 4 | 1 | - | 1 | 1 | - | 1 | - | - | 8 | - | - | - | 160 | | 8 | |
| | 02 | 1 | 1 | 2 | 1 | - | - | - | - | - | 5 | - | - | - | 100 | | 5 | |
| M | 89 | - | - | 4 | - | - | - | - | - | - | 4 | - | - | - | 266 | 25 | 27 | |
| | 99 | - | 5 | 5 | - | 9 | 22 | - | - | - | 34 | 5 | 2 | - | 820 | 32 | 33 | |
| | 02 | 1 | - | 32 | - | - | 3 | - | - | - | 36 | - | - | - | 720 | 27 | 32 | |
| D | 89 | - | - | - | - | - | - | - | - | - | - | - | - | - | 0 | | 0 | |
| | 99 | - | - | - | - | - | 4 | 3 | - | - | 4 | - | - | 3 | 140 | | 7 | |
| | 02 | - | - | 12 | - | - | 3 | - | - | - | 9 | - | - | 6 | 300 | | 15 | |
| X | 89 | - | - | - | - | - | - | - | - | - | - | - | - | - | 0 | | 0 | |
| | 99 | - | - | - | - | - | - | - | - | - | - | - | - | - | 0 | | 0 | |
| | 02 | - | - | - | - | - | - | - | - | - | - | - | - | - | 60 | | 3 | |
| % Plants Showing | | <u>Moderate Use</u> | | | <u>Heavy Use</u> | | | <u>Poor Vigor</u> | | | <u>%Change</u> | | | | | | | |
| '89 | | 17% | | | 67% | | | 00% | | | +64% | | | | | | | |
| '99 | | 29% | | | 55% | | | 09% | | | + 0% | | | | | | | |
| '02 | | 02% | | | 93% | | | 11% | | | | | | | | | | |
| Total Plants/Acre (excluding Dead & Seedlings) | | | | | | | | | | | | '89 | 399 | Dec: | 0% | | | |
| | | | | | | | | | | | | '99 | 1120 | | 13% | | | |
| | | | | | | | | | | | | '02 | 1120 | | 27% | | | |
| Chrysothamnus depressus | | | | | | | | | | | | | | | | | | |
| M | 89 | - | - | - | - | - | - | - | - | - | - | - | - | - | 0 | - | - | |
| | 99 | 7 | - | - | - | - | - | - | - | - | 7 | - | - | - | 140 | - | - | |
| | 02 | 3 | 8 | - | - | - | - | - | - | - | 3 | - | - | - | 220 | 6 | 11 | |
| D | 89 | - | - | - | - | - | - | - | - | - | - | - | - | - | 0 | | 0 | |
| | 99 | - | - | 1 | - | - | - | - | - | - | - | - | - | 1 | 20 | | 1 | |
| | 02 | - | - | - | - | - | - | - | - | - | - | - | - | - | 0 | | 0 | |
| % Plants Showing | | <u>Moderate Use</u> | | | <u>Heavy Use</u> | | | <u>Poor Vigor</u> | | | <u>%Change</u> | | | | | | | |
| '89 | | 00% | | | 00% | | | 00% | | | | | | | | | | |
| '99 | | 00% | | | 13% | | | 13% | | | +27% | | | | | | | |
| '02 | | 73% | | | 00% | | | 00% | | | | | | | | | | |
| Total Plants/Acre (excluding Dead & Seedlings) | | | | | | | | | | | | '89 | 0 | Dec: | 0% | | | |
| | | | | | | | | | | | | '99 | 160 | | 13% | | | |
| | | | | | | | | | | | | '02 | 220 | | 0% | | | |

| A G E | Y R | Form Class (No. of Plants) | | | | | | | | | Vigor Class | | | | Plants Per Acre | Average (inches) Ht. Cr. | | Total |
|--|--------|----------------------------|----|---|------------------|---|---|-------------------|---|---|----------------|-----|------|------|--------------------|--------------------------------|----|-------|
| | | 1 | 2 | 3 | 4 | 5 | 6 | 7 | 8 | 9 | 1 | 2 | 3 | 4 | | | | |
| Chrysothamnus viscidiflorus viscidiflorus | | | | | | | | | | | | | | | | | | |
| Y | 89 | 8 | - | - | - | - | - | - | - | - | 8 | - | - | - | 533 | | 8 | |
| | 99 | 10 | - | - | 1 | - | - | - | - | - | 11 | - | - | - | 220 | | 11 | |
| | 02 | 9 | - | - | - | - | - | - | - | - | 9 | - | - | - | 180 | | 9 | |
| M | 89 | 51 | - | - | - | - | - | - | - | - | 50 | - | 1 | - | 3400 | 12 | 15 | |
| | 99 | 98 | 11 | - | 11 | - | - | - | - | - | 120 | - | - | - | 2400 | 8 | 14 | |
| | 02 | 102 | - | - | 2 | - | - | - | - | - | 104 | - | - | - | 2080 | 7 | 12 | |
| D | 89 | 5 | - | - | - | - | - | 1 | - | - | 6 | - | - | - | 400 | | 6 | |
| | 99 | 7 | - | - | - | - | - | 1 | - | - | 2 | - | - | 6 | 160 | | 8 | |
| | 02 | 1 | - | - | 1 | - | - | - | - | - | 1 | - | 1 | - | 40 | | 2 | |
| % Plants Showing | | <u>Moderate Use</u> | | | <u>Heavy Use</u> | | | <u>Poor Vigor</u> | | | <u>%Change</u> | | | | | | | |
| '89 | | 00% | | | 00% | | | 02% | | | -36% | | | | | | | |
| '99 | | 08% | | | 00% | | | 04% | | | -17% | | | | | | | |
| '02 | | 00% | | | 00% | | | .86% | | | | | | | | | | |
| Total Plants/Acre (excluding Dead & Seedlings) | | | | | | | | | | | | '89 | 4333 | Dec: | 9% | | | |
| | | | | | | | | | | | | '99 | 2780 | | 6% | | | |
| | | | | | | | | | | | | '02 | 2300 | | 2% | | | |
| Cowania mexicana stansburiana | | | | | | | | | | | | | | | | | | |
| M | 89 | - | - | - | - | - | - | - | - | - | - | - | - | - | 0 | - | - | |
| | 99 | - | - | - | - | - | - | - | - | - | - | - | - | - | 0 | 44 | 48 | |
| | 02 | - | - | - | - | - | - | - | - | - | - | - | - | - | 0 | - | - | |
| % Plants Showing | | <u>Moderate Use</u> | | | <u>Heavy Use</u> | | | <u>Poor Vigor</u> | | | <u>%Change</u> | | | | | | | |
| '89 | | 00% | | | 00% | | | 00% | | | | | | | | | | |
| '99 | | 00% | | | 00% | | | 00% | | | | | | | | | | |
| '02 | | 00% | | | 00% | | | 00% | | | | | | | | | | |
| Total Plants/Acre (excluding Dead & Seedlings) | | | | | | | | | | | | '89 | 0 | Dec: | - | | | |
| | | | | | | | | | | | | '99 | 0 | | - | | | |
| | | | | | | | | | | | | '02 | 0 | | - | | | |
| Juniperus osteosperma | | | | | | | | | | | | | | | | | | |
| S | 89 | 1 | - | - | - | - | - | - | - | - | 1 | - | - | - | 66 | | 1 | |
| | 99 | 1 | - | - | - | - | - | - | - | - | 1 | - | - | - | 20 | | 1 | |
| | 02 | 1 | - | - | - | - | - | - | - | - | 1 | - | - | - | 20 | | 1 | |
| % Plants Showing | | <u>Moderate Use</u> | | | <u>Heavy Use</u> | | | <u>Poor Vigor</u> | | | <u>%Change</u> | | | | | | | |
| '89 | | 00% | | | 00% | | | 00% | | | | | | | | | | |
| '99 | | 00% | | | 00% | | | 00% | | | | | | | | | | |
| '02 | | 00% | | | 00% | | | 00% | | | | | | | | | | |
| Total Plants/Acre (excluding Dead & Seedlings) | | | | | | | | | | | | '89 | 0 | Dec: | - | | | |
| | | | | | | | | | | | | '99 | 0 | | - | | | |
| | | | | | | | | | | | | '02 | 0 | | - | | | |

| A G E | Y R | Form Class (No. of Plants) | | | | | | | | | Vigor Class | | | | Plants Per Acre | Average (inches) Ht. Cr. | | Total |
|--|--------|----------------------------|---|---|------------------|---|---|-------------------|---|---|----------------|-----|------|------|--------------------|--------------------------------|----|-------|
| | | 1 | 2 | 3 | 4 | 5 | 6 | 7 | 8 | 9 | 1 | 2 | 3 | 4 | | | | |
| Mahonia repens | | | | | | | | | | | | | | | | | | |
| Y | 89 | 3 | - | - | - | - | - | - | - | - | 3 | - | - | - | 200 | | 3 | |
| | 99 | 21 | - | - | - | - | - | - | - | - | 21 | - | - | - | 420 | | 21 | |
| | 02 | - | - | - | - | - | - | - | - | - | - | - | - | - | 0 | | 0 | |
| M | 89 | - | - | - | - | - | - | - | - | - | - | - | - | - | 0 | - | 0 | |
| | 99 | 81 | - | - | - | - | - | - | - | - | 81 | - | - | - | 1620 | 2 | 81 | |
| | 02 | 57 | - | - | - | - | - | - | - | - | 57 | - | - | - | 1140 | 4 | 57 | |
| % Plants Showing | | <u>Moderate Use</u> | | | <u>Heavy Use</u> | | | <u>Poor Vigor</u> | | | <u>%Change</u> | | | | | | | |
| '89 | | 00% | | | 00% | | | 00% | | | +90% | | | | | | | |
| '99 | | 00% | | | 00% | | | 00% | | | -44% | | | | | | | |
| '02 | | 00% | | | 00% | | | 00% | | | | | | | | | | |
| Total Plants/Acre (excluding Dead & Seedlings) | | | | | | | | | | | | '89 | 200 | Dec: | - | | | |
| | | | | | | | | | | | | '99 | 2040 | | - | | | |
| | | | | | | | | | | | | '02 | 1140 | | - | | | |
| Opuntia spp. | | | | | | | | | | | | | | | | | | |
| Y | 89 | - | - | - | - | - | - | - | - | - | - | - | - | - | 0 | | 0 | |
| | 99 | - | - | - | - | - | - | - | - | - | - | - | - | - | 0 | | 0 | |
| | 02 | 2 | - | - | - | - | - | - | - | - | 2 | - | - | - | 40 | | 2 | |
| M | 89 | - | - | - | - | - | - | - | - | - | - | - | - | - | 0 | - | 0 | |
| | 99 | 1 | - | - | - | - | - | - | - | - | 1 | - | - | - | 20 | 3 | 1 | |
| | 02 | 1 | - | - | - | - | - | - | - | - | 1 | - | - | - | 20 | 2 | 1 | |
| % Plants Showing | | <u>Moderate Use</u> | | | <u>Heavy Use</u> | | | <u>Poor Vigor</u> | | | <u>%Change</u> | | | | | | | |
| '89 | | 00% | | | 00% | | | 00% | | | | | | | | | | |
| '99 | | 00% | | | 00% | | | 00% | | | +67% | | | | | | | |
| '02 | | 00% | | | 00% | | | 00% | | | | | | | | | | |
| Total Plants/Acre (excluding Dead & Seedlings) | | | | | | | | | | | | '89 | 0 | Dec: | - | | | |
| | | | | | | | | | | | | '99 | 20 | | - | | | |
| | | | | | | | | | | | | '02 | 60 | | - | | | |

| A G E | Y R | Form Class (No. of Plants) | | | | | | | | | Vigor Class | | | | Plants Per Acre | Average (inches) Ht. Cr. | | Total |
|--|--------|----------------------------|----|----|------------------|---|---|-------------------|---|---|----------------|-----|-----|------|--------------------|--------------------------------|----|-------|
| | | 1 | 2 | 3 | 4 | 5 | 6 | 7 | 8 | 9 | 1 | 2 | 3 | 4 | | | | |
| Purshia tridentata | | | | | | | | | | | | | | | | | | |
| S | 89 | 1 | - | - | - | - | - | - | - | - | 1 | - | - | - | 66 | | 1 | |
| | 99 | - | - | - | - | - | - | - | - | - | - | - | - | - | 0 | | 0 | |
| | 02 | - | - | - | - | - | - | - | - | - | - | - | - | - | 0 | | 0 | |
| Y | 89 | - | - | - | - | - | - | 1 | - | - | 1 | - | - | - | 66 | | 1 | |
| | 99 | 2 | 2 | - | 1 | - | - | - | - | - | 5 | - | - | - | 100 | | 5 | |
| | 02 | - | 1 | 1 | - | - | - | - | - | - | 2 | - | - | - | 40 | | 2 | |
| M | 89 | - | 1 | - | - | - | - | - | - | - | 1 | - | - | - | 66 | 17 | 19 | |
| | 99 | 3 | 10 | 3 | - | 5 | 1 | - | - | - | 22 | - | - | - | 440 | 23 | 51 | |
| | 02 | - | 2 | 5 | - | - | 4 | - | - | - | 11 | - | - | - | 220 | 16 | 43 | |
| D | 89 | - | - | - | - | - | - | - | - | - | - | - | - | - | 0 | | 0 | |
| | 99 | - | - | - | - | - | - | - | - | - | - | - | - | - | 0 | | 0 | |
| | 02 | - | - | 12 | - | - | 1 | - | - | - | 7 | - | - | 6 | 260 | | 13 | |
| X | 89 | - | - | - | - | - | - | - | - | - | - | - | - | - | 0 | | 0 | |
| | 99 | - | - | - | - | - | - | - | - | - | - | - | - | - | 40 | | 2 | |
| | 02 | - | - | - | - | - | - | - | - | - | - | - | - | - | 0 | | 0 | |
| % Plants Showing | | <u>Moderate Use</u> | | | <u>Heavy Use</u> | | | <u>Poor Vigor</u> | | | <u>%Change</u> | | | | | | | |
| '89 | | 50% | | | 00% | | | 00% | | | +76% | | | | | | | |
| '99 | | 63% | | | 15% | | | 00% | | | - 4% | | | | | | | |
| '02 | | 12% | | | 88% | | | 23% | | | | | | | | | | |
| Total Plants/Acre (excluding Dead & Seedlings) | | | | | | | | | | | | '89 | 132 | Dec: | 0% | | | |
| | | | | | | | | | | | | '99 | 540 | | 0% | | | |
| | | | | | | | | | | | | '02 | 520 | | 50% | | | |
| Quercus gambelii | | | | | | | | | | | | | | | | | | |
| S | 89 | - | - | - | - | - | - | - | - | - | - | - | - | - | 0 | | 0 | |
| | 99 | 1 | - | - | - | - | - | - | - | - | 1 | - | - | - | 20 | | 1 | |
| | 02 | - | - | - | - | - | - | - | - | - | - | - | - | - | 0 | | 0 | |
| % Plants Showing | | <u>Moderate Use</u> | | | <u>Heavy Use</u> | | | <u>Poor Vigor</u> | | | <u>%Change</u> | | | | | | | |
| '89 | | 00% | | | 00% | | | 00% | | | | | | | | | | |
| '99 | | 00% | | | 00% | | | 00% | | | | | | | | | | |
| '02 | | 00% | | | 00% | | | 00% | | | | | | | | | | |
| Total Plants/Acre (excluding Dead & Seedlings) | | | | | | | | | | | | '89 | 0 | Dec: | - | | | |
| | | | | | | | | | | | | '99 | 0 | | - | | | |
| | | | | | | | | | | | | '02 | 0 | | - | | | |

| A G E | Y R | Form Class (No. of Plants) | | | | | | | | | Vigor Class | | | | Plants Per Acre | Average (inches) Ht. Cr. | | Total |
|--|--------|----------------------------|---|---|------------------|---|---|-------------------|---|---|----------------|-----|------|------|--------------------|--------------------------------|-----|-------|
| | | 1 | 2 | 3 | 4 | 5 | 6 | 7 | 8 | 9 | 1 | 2 | 3 | 4 | | | | |
| Symphoricarpos oreophilus | | | | | | | | | | | | | | | | | | |
| S | 89 | 3 | - | - | - | - | - | - | - | - | 3 | - | - | - | 200 | | 3 | |
| | 99 | 15 | - | - | 1 | - | - | - | - | - | 16 | - | - | - | 320 | | 16 | |
| | 02 | - | - | - | - | - | - | - | - | - | - | - | - | - | 0 | | 0 | |
| Y | 89 | 22 | 1 | - | - | - | - | - | - | - | 22 | - | 1 | - | 1533 | | 23 | |
| | 99 | 66 | - | - | 3 | - | - | 1 | - | - | 69 | - | 1 | - | 1400 | | 70 | |
| | 02 | 50 | - | - | - | - | - | 3 | - | - | 53 | - | - | - | 1060 | | 53 | |
| M | 89 | 84 | 1 | 1 | 1 | - | - | 2 | - | - | 83 | - | 6 | - | 5933 | 16 21 | 89 | |
| | 99 | 150 | 4 | - | 52 | 2 | - | - | - | - | 201 | - | 5 | - | 4160 | 19 33 | 208 | |
| | 02 | 232 | - | - | 50 | - | - | 1 | - | - | 280 | 3 | - | - | 5660 | 11 17 | 283 | |
| D | 89 | 10 | 3 | - | - | - | - | - | - | - | 7 | - | 3 | 3 | 866 | | 13 | |
| | 99 | 7 | - | - | 4 | - | - | 1 | - | - | 4 | - | - | 8 | 240 | | 12 | |
| | 02 | 12 | - | - | 1 | - | - | - | - | - | 6 | - | 2 | 5 | 260 | | 13 | |
| X | 89 | - | - | - | - | - | - | - | - | - | - | - | - | - | 0 | | 0 | |
| | 99 | - | - | - | - | - | - | - | - | - | - | - | - | - | 60 | | 3 | |
| | 02 | - | - | - | - | - | - | - | - | - | - | - | - | - | 20 | | 1 | |
| % Plants Showing | | <u>Moderate Use</u> | | | <u>Heavy Use</u> | | | <u>Poor Vigor</u> | | | <u>%Change</u> | | | | | | | |
| '89 | | 04% | | | .80% | | | 10% | | | -30% | | | | | | | |
| '99 | | 02% | | | 00% | | | 05% | | | +17% | | | | | | | |
| '02 | | 00% | | | 00% | | | 02% | | | | | | | | | | |
| Total Plants/Acre (excluding Dead & Seedlings) | | | | | | | | | | | | '89 | 8332 | Dec: | 10% | | | |
| | | | | | | | | | | | | '99 | 5800 | | 4% | | | |
| | | | | | | | | | | | | '02 | 6980 | | 4% | | | |
| Tetradymia canescens | | | | | | | | | | | | | | | | | | |
| S | 89 | - | - | - | - | - | - | - | - | - | - | - | - | - | 0 | | 0 | |
| | 99 | 7 | - | - | - | - | - | - | - | - | 7 | - | - | - | 140 | | 7 | |
| | 02 | - | - | - | - | - | - | - | - | - | - | - | - | - | 0 | | 0 | |
| Y | 89 | - | - | - | - | - | - | - | - | - | - | - | - | - | 0 | | 0 | |
| | 99 | 11 | - | - | - | - | - | - | - | - | 11 | - | - | - | 220 | | 11 | |
| | 02 | 1 | - | - | - | - | - | - | - | - | 1 | - | - | - | 20 | | 1 | |
| M | 89 | - | - | - | - | - | - | - | - | - | - | - | - | - | 0 | - - | 0 | |
| | 99 | 27 | 1 | - | 1 | - | - | 1 | - | - | 30 | - | - | - | 600 | 13 20 | 30 | |
| | 02 | 20 | - | 1 | 2 | - | - | - | - | - | 23 | - | - | - | 460 | 12 21 | 23 | |
| D | 89 | - | - | - | - | - | - | - | - | - | - | - | - | - | 0 | | 0 | |
| | 99 | 5 | 2 | - | - | - | - | - | - | - | 6 | - | - | 1 | 140 | | 7 | |
| | 02 | 5 | 1 | - | - | - | - | - | - | - | 2 | - | - | 4 | 120 | | 6 | |
| % Plants Showing | | <u>Moderate Use</u> | | | <u>Heavy Use</u> | | | <u>Poor Vigor</u> | | | <u>%Change</u> | | | | | | | |
| '89 | | 00% | | | 00% | | | 00% | | | -38% | | | | | | | |
| '99 | | 06% | | | 00% | | | 02% | | | | | | | | | | |
| '02 | | 03% | | | 03% | | | 13% | | | | | | | | | | |
| Total Plants/Acre (excluding Dead & Seedlings) | | | | | | | | | | | | '89 | 0 | Dec: | 0% | | | |
| | | | | | | | | | | | | '99 | 960 | | 15% | | | |
| | | | | | | | | | | | | '02 | 600 | | 20% | | | |